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### Cephalopod remains from the stomach of a Risso's dolphin, *Grampus griseus* (Cetacea: Delphinidae), stranded along the eastern Tyrrhenian coast

Resti di cefalopodi nello stomaco di un grampo, *Grampus griseus* (Cetacea: Delphinidae), spiaggiato lungo la costa tirrenica orientale.

Resti di due esemplari di *Loligo forbesii* (Loliginidae) e di un *Todarodes sagittatus* (Ommastrephidae) sono stati rinvenuti nello stomaco di un grampo, *Grampus griseus* (Cuvier, 1812), spiaggiato a Torre Annunziata (Napoli), Tirreno orientale.

#### Introduction

The Risso's dolphin, *Grampus griseus* (Cuvier, 1812), preys upon cephalopods exclusively (cf. Clarke & Pascoe, 1985). Only in the last decade, however, have cephalopod remains from the stomachs of Risso's dolphins been identified at the species level (Clarke & Pascoe, 1985; Desportes, 1985; Podestà & Menotti, 1991; Bello, 1992; Carlini *et al.*, 1992; Würtz *et al.*, 1992). Overall, a comparatively small number of dolphin specimens, all of which died from natural or accidental causes, have been examined for food analysis.

A Risso's dolphin, stranded in low waters at Torre Annunziata (Prov. of Naples, eastern Tyrrhenian Sea) and subsequently killed by unknown persons on March 3<sup>rd</sup> 1994, provided material for stomach content examination. Unfortunately, only part of the contents were saved.

#### Materials and methods

The Risso's dolphin was a male 2.94 m long. The necropsy showed that the animal was affected by hemorrhagic septicemia. The stomach contained fleshy cephalopod remains.

Much of the stomach contents which had been frozen for storage was discarded following a breakage of the freezer. Only the remains from three

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cephalopods were suitable for analysis; they consisted of a buccal mass and two upper beaks (mandibles). The loose beaks and those removed from the buccal mass were identified using the works by Clarke (1962, 1986) and by comparing them with beaks extracted from whole cephalopods of known identity (vouchers). The standard dimensions of upper rostral length (URL) and lower rostral length (LRL) were measured. The radula was also removed from the buccal mass and examined.

The size and weight of prey items were established from beak size by the equations reported by Clarke (1986), which use the LRL as the independent variable. In the two cases where only the upper beak was available, their corresponding LRL's were calculated by means of the ratio URL/LRL of voucher beak pairs.

## Results

The buccal mass and the smaller upper beak belonged to *Loligo forbesii* Steenstrup, 1856 (Teuthoidea: Loliginidae); the larger upper beak was from *Todarodes sagittatus* Lamarck, 1798 (Teuthoidea: Ommastrephidae). The following table summarizes the beak measurements and the cephalopods' estimated mantle length (EML) and estimated weight (EW).

species	URL (mm)	LRL (mm)	radula	EML (cm)	EW (g.)
<i>Loligo forbesii</i>	2.0	2.4	yes	16	150
<i>Loligo forbesii</i>	2.4	—	no	20	240
<i>Todarodes sagittatus</i>	8.4		no	31	760

The buccal mass was identified as *L. forbesii* in spite of a somewhat abnormal feature of the lower beak, that is, the jaw edge was connected with the shoulder by a round curve (Fig. 1). Nevertheless, the whole set of characteristics of the upper and lower beaks and radula allowed the remains to be attributed to *L. forbesii*. The lower rostral edge and jaw angle of loliginid squids appear to be rather variable; see also the silhouettes of *Loligo vulgaris* lower beaks reported in Fig. 4A of Mangold & Fioroni (1966).

In addition to comparison with vouchers, the ommastrephid upper beak was identified as *T. sagittatus* because of the ratio rostral length/rostral width = 1.40, which falls in the range typical of this species. The only other Mediterranean ommastrephid squid that reaches a size as large as that of the item found in the dolphin's stomach, viz. *Ommastrephes bartramii*, has wider beaks (Clarke, 1962): the ratio of rostral length/rostral width in a *O. bartramii* upper beak of comparable size is about 1.15.

## Discussion

*Todarodes sagittatus* is commonly found in the stomach contents of Risso's dolphins from both the Atlantic Ocean (Clarke & Pascoe, 1985) and the Mediterranean Sea (Desportes, 1985; Carlini *et al.*, 1992; Würtz *et al.*, 1992; Bello, 1992 and unpublished data). This ommastrephid squid is an

oceanic species that lives mostly in waters deeper than 500 m and carries out daily vertical migrations ascending towards the surface at night (Clarke, 1966). The estimated weight of the *T. sagittatus* item from the present dolphin's stomach (760 g) is close to the largest prey weight reported in the literature, i. e. 762 g, mean weight for 16 specimens of *Eledone cirrhosa* (Clarke & Pascoe, 1985).

The occurrence of *Loligo forbesii* in the stomachs of Mediterranean Risso's dolphins has not been recorded previously, it has only been reported in an Atlantic specimen by Clarke & Pascoe (1985). *L. forbesii* usually lives closer to the coast than *T. sagittatus*, in depth ranges from 100 to 400 m (Mangold & Boletzky, 1987).

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